Notebook, N-01-04-23

This notebook covers the period April-May 1901. All entries are by Edison. The book contains notes and drawings regarding thermocouple experiments. A few entries pertain to phonographs and to drilling technology, probably for Edison's ore milling or cement operations. Also included is a draft of a lecture on alkaline storage batteries, prepared by Edison for presentation by Arthur E. Kennelly to the American Institute of Electrical Engineers ("The New Edison Storage Battery," *AIEE Transactions* 18 (1901): 219-30). The pages are unnumbered, and the book has been used in both directions. Approximately 90 pages have been used.

1800

460-
25
2400
760
1200
1120
2240) 5535
1120
4220
4200
1200

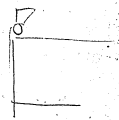
535-
340
2140
1605-
1717.

40 Cranes
16 X01 - Elev
5 R Feed I Elev -
20 X02
20 X03
8 Cons 3 -
6 X00 1 & 2 C.

115 --
5
10
10
20
50
10
210
210
420

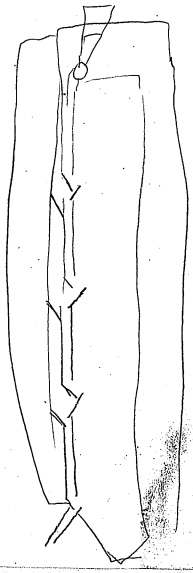
4 2240
8960
4) 3700) 5376 00 (16
3300
2060

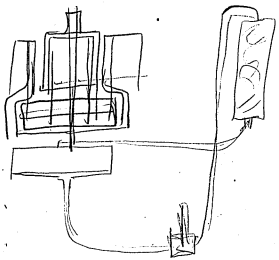
$16

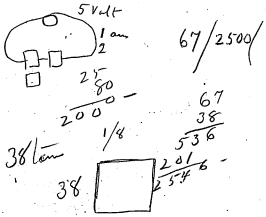


2970
1000
3900
26
3120
444
78
1185
88
67 -
87/0 -
555-2
444
64 3970
3108
2667
2,974 . 3900

cloth






5volt
1 am
2
25
80
200
1/4
38 lam
38
67/2500/
67
38
536
201/6
254

The way

24
3
32
59
72
28
6
132 - 2 ox

27
32
59
72
18
34
132

Acetate of mercuriammonium very sol in water Watts 17 Vol 1

Cu ~~precip~~ Reduces Sol from Nickel ammonium

" " arsenic from Sulfite when hot +

" molybdic with HCl -

Arsenic Hydrides one gas other solid

Solid is made by using metallic arsenic as Electrode at positive pole -

Why not use this as Cinchona Tablet -

Benzomercuriamide very Sol - Watts 1 - 539

Cop precips Bi from Sol in metallic state

Bismuthic oxide Bi_2O_5 is reduced to Bi_2O_4 at 100 cent, Try sort B - Carbon

Try Ferric chloride on Carb - pp the Ferric ox in porous mass it will be dry Electrode

Platinum Carbon Coil in Chlpt
then ignite in charcoal – Carbon charcoal itself absorbs
H_2O with Try battery
40 Volts NO – See if NO is oxidized & its exothermic –
deoxidized easily

Make Electrodes of Cocoanut charcoal

~~Chl Ammonia Carb [illegible] fine~~
~~Metmorphine S.A. 4 Vol. which [illegible]~~
~~Tryphal [illegible]~~

NG

Try Cd a Hg Carb. Elec in
strong Carb Soda dittos
Zn & Hg Carb Elec
insame –

Try Molybdenum
antimony + Copper on Carbon
plate against Cd —

For Carbon plates - Examine under
Microscope - Try hydroxides of Sr Ba
Ca + have Freddy test them -
also heat chalk full red
with carbon
plate some —

Try experiment passing dry NH_3 & CO_2
into a chamber 1 sec of get
powdered Carb NH

Put a pair of 4 gram Carbons
in 30% KOH + put heavy current
1/2 amp 4 sec of C discharge & change
solutions when get too much
colors

60-

4-

$18.

5

30.

1.25
40
50 0 0

20-

70
20

1.75

60-

44 | 750 | 17
94
318
30

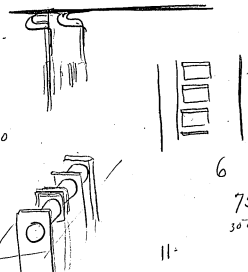
23 | 750 | 32.5
69
60
60
70

24
16
144
24
3 6 4

2 2.6

75
1 5 3 6
1 5 3 6
1 6 8
1 4 0
1 9 2 0
1 4 4
4 8 0
4 8 0

125



200

6

750
40
300

11.

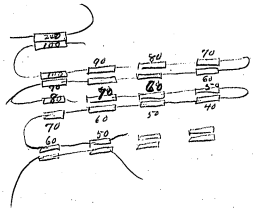
64
40
320.0

384
40
1920

384
40
153.60

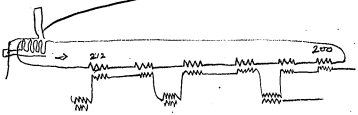
64

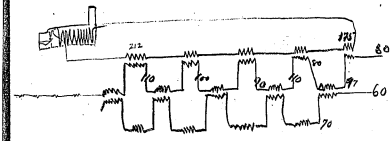
$153.

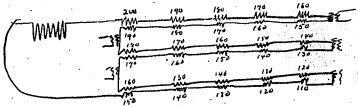


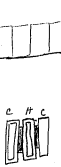
April 23 1901

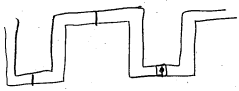
Thermo Gat

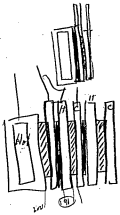












Evidently a fall from 212 To 80 would give same Volts on one element, with somewhat higher Res that the value of element from 212 To 80 would be. Evidently there is only one principle involved here; Res to Elec is ~~not~~ same as to heat but the rate of loss that counts, the principle almost makes the two both Economical

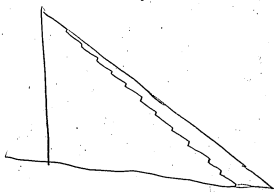
Multiple 14 turns heat - series more voltage

10 sec. 100 fall 212 to 80 —
as against the whole in multiple Latter fall 212 to 80 —
100 times the amount of heat, 100 times lower the Rise
so apparently gets same result,
but electric raw is a annual defeat
as compared to rapid heat Conductively

~~[illegible] of 212 to 80~~

The only transmitter of heat to E latter
placed at generating, hence if you have
a fall from 212 to 80 through 10 pounds
you get ~~no more~~ more amount of Watts
in first less but you have lumm
more heat into E —

4 20 33 Jots inch 4" 120 alternations



Heat transmitted from Water to Wall
thru plates 400 to 600 Heat units
per 0-gr foot per hour per
degree of def of temp
while from hot air to Water only
5 Heat units =

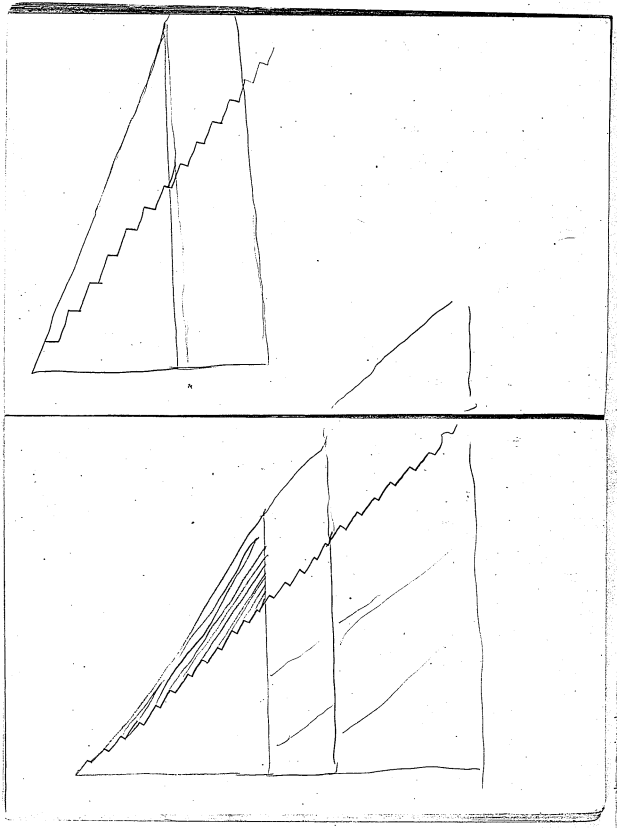
10'000 heat,

746 — abt — 1 HP per hour per deg
150 HP per hour for 150 deg
on 1 square foot, 90'000 Heat
9 Lbs Coal =

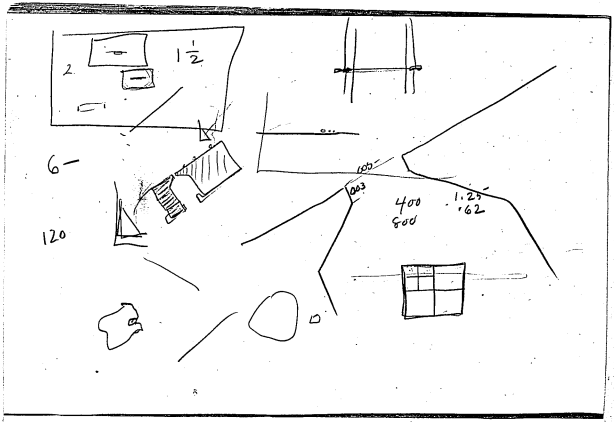
600 | 10000 / 6000 / 90000 | 16.

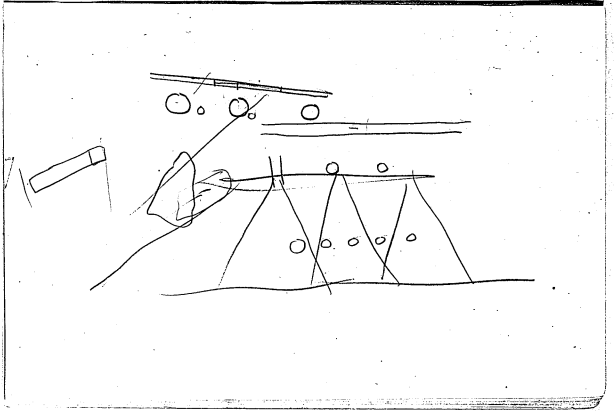
150 600 90000

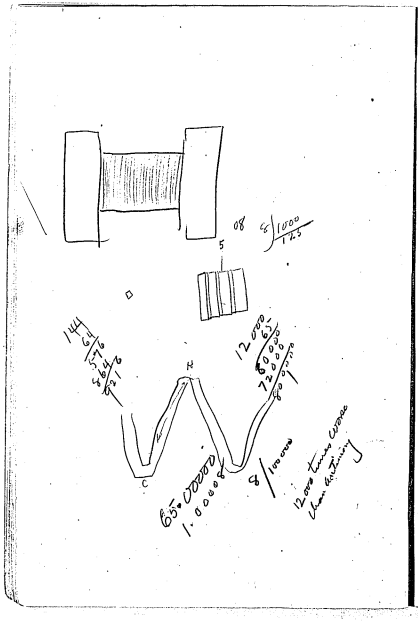
16 | 150 | 10

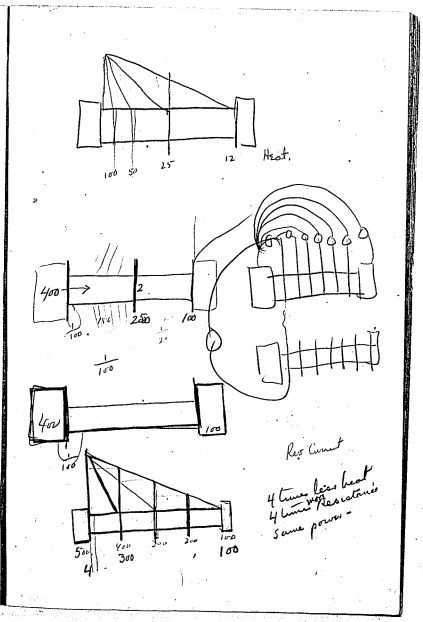


6-10


2
1 1/2
6
120
100
003
400
600
1.25
.62




5
08
1000
125
144
576
3456
20
12 000
60 000
720 000
60 000
H
C
8
100 000
65 000
1.00000
12 000 times current
than distance


100
50
25
12
Heat.
400
2
100
250
100
1/100
400
100
100
Rey Current
4 times less heat
4 times more radiation
same power -
500
400
300
200
100
100
4

Pass. NH_3 over Ferric –
" CO_1
Cy

Do from reducible by Mg alone Zn

" Ferrous ox from Hornblende
Eat silica by Hydrofluoric –

Trying to sep Fe_2O_3 by
Magnesia hydroxide & Sulp Iron
Use Ferrous Sulfate,

Precip by NH_3 Some Ferrous
Sulphate in strong Sugar
Salts + boil hard,

Precip Sul Ferrous in boiling
Rock Candy Sugar
with Tartaric acid

13 lb Lot. ~~Chlorinated~~ Nb_2O_5 -
powder fine + boil in 5% KOH,
dilute this + filter off —
test for Sulphuric (+HCl) acid
Think there is basic salts in
both, + it may be necessary
to ~~boil~~ soak the Nb_2O_3 with
1% KOH + then re percolate,
Might take some of the 13 lot
now percolating + when
finished - put some back +
percolate with 2% Sal KOH
+ afterwards Water —
Make Na amalgam + squeeze
dry out =

21 lb —

21) 12 / 16 / 12 / 1,989 (9

9) 746 (82 lb

160
40
64
640
704
8960
746) 9,43
8960
2984
2984
1327

14
17
746) 9,43 (80 lb
746
1944
1944
26
26.73
26.
52
Cu

240
480
7680
1440
1440
32

440) 7680 (17

4 lb. 8) 200 / 25

3½ lb

1
50 sp pounds
23
7

Try ordinary KOH alloy of
Iron + Aluminum
" Zinc —
" Lead —
" ~~Spinel~~

The al Zn Pb will dissolve + leave black powder iron —

Make grid Cupric hydroxide green + oxidize up by Current, Jelande —

Reduce ~~Fe Cl~~ ferric Cl by H. to

~~Try grid with Fe Cl, heated to 200 w/o~~

Reduce phosphide Iron by H —

Make some ferric + Keep on hydrogen at 900 for 5 hours then cool + Keep in 6 more — Idea Can Iron reduced to metallic —
Iron low temp may be oxidized
Must dry the oxide must be very fine

~~Examine filtering~~ —

See Dyer foreign patent —

~~see about Cooling chamber~~

~~see about Const map~~

Make: Cupric Cu_2O_3 grid —
Ni Hydroxide grid & change
"
"

See about new Hematite mag change
how it works so can order steel ones

see about Magnetite separator
Mag Heater is doing —

Write Brooklyn Pattern man tell
him what we want for chlorine
generator —

~~Have Dyeing room~~ —

get W + Chapman man + start
in 1st batch stuff — so as to
get ready for dyeing —

Treatment of 5 lb batch Peroxide
with soda after powdering them
redry + make good soda squeeling
of Curve —

get Benson enough Mn perox
for engel - Freddy mix & grind
in regular way just as we put
in grid -

See Dumphus about new Coal
house change -

See Drewenald & get goodame
tank ok -

Have chemist make some
Cement from our rock
Enough to make test brick -
find Newberry book where he
made the experiments -

Test alloys & [illegible] some
perhaps Spiegeleisen dis in acid
deliverate Fe as acid drill 1st
go for Mn

By heating ferrocyanide to redness a compound of C & Fe attained possibly Fe can be oxidized by current

grid with precipitd dried ferrous carbonate, put in boiling KOH 20% & reduced by current.

" grid with ferric ox dried & boiled in Tartaric acid in KOH – to reduce to ferrous chl –

Zinc immersed in a perfectly neutral sol ferrous sulfate in a closed bottle throws down insoluble Fe with oxide which deposited partly on the Zinc & on side of bottle –

grid with ferrous sulphite –

also ferrous " to 800 in tube

Weight of battery Box
Oak - 4 lbs for 2 cells —
44 cells weigh about
" 85 lbs without the top.
100 with top —

12 HP hours above for 8½ lbs per
hp hour - for wood -

Through coke say that
Cost Box including Carbon
23 Cents. 100 lbs $6.00

24
54
96
1296
129.6

264

25.0
1320
132.0

35
42
129
206
32
12
4.2
6.39
453

1.75
124
70
350
42.0

60
49
109
8.4

14.3
5.5

20 lbs

453 | 6.39
453
1962
1812
150

Weights 2.83 oz
453 gr

One cell —

Box 1
2 pounds
Iron jar 264 grams
Wt of Empty grid 35 grams
Wt of Cups 1.75 each
Wt of Iron Cake 6
" Ni " 4.6

lbs 7.8 Iron grid complete:
Cupcake grid 186
35
221

186
6.32

221 grams

lbs 6.5 Ni grid Complete
Cupcake grid 187
453

187

Cell 9.3 oz
Box 2 lbs

0031

25

10. $2\frac{1}{2}$

50

7" 2

125

60)17.00(2.9

125.0
102.0
9.3
80.0
8.0
1.0
3.0

16)328.3(20 lbs

32

125
102
22.7
16
6.4
6.4

16)

Wt

Cell	9.3	3
Box	32.	3
Iron grid	125	3
Ni. "	102	3

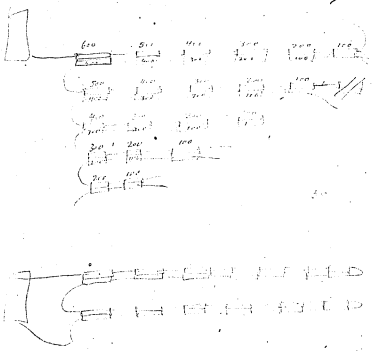
16)268(16.75

16
108
96
120
112
80

16.75 lbs per Cell
(without Liquid)

4 lbs liquid

Thursday May 10 - 1951



Magnetic Storage Battery
" Battery
Iron Battery -
Electric Condenser
Condenser
Nickel Iron Battery -
Condensing battery
Condenser -
Nickel Battery

I present this evening to the Society a new and novel ~~of~~ combination for Condensing or storing Electric Energy ~~which is by Dr. Dixon~~ invented by Edison and which is adapted for all kinds of Electric work and is especially valuable for ~~motive power~~ Vehicle Traction, It contains all of the elements which go to making it a permanent ~~commercial~~ and so far as now known ~~and [illegible]~~ has no determination, Mechanically Chemically Electrically & Commercially it bids fair to be all that can be ~~[illegible]~~ desired in the present state of the art—

~~many~~ The Lead battery has been constructed in every conceivable form since the invention but so far it has not been as satisfactory as could be desired. Especially so in Vehicle Traction. It would seem that the very nature of the Combination & the Chemical reactions were against its successful perfection —

Many attempts have been made to perfect Storage Cells of the ~~[illegible]~~ Alkaline Zincate type, but the great difficulty of ~~that~~ depositing Zinc out of solution or in a Coherent form & the absence of a good depolarizer whose Oxide is insoluble in the Electrolyte, and the large amount of liquid necessary to ~~[illegible]~~ dissolve the Zinc has made this type of Battery obsolete —

Edison set down certain ~~[illegible]~~ ~~[illegible]~~ requirements necessary to the perfection of a Commercially Valuable Battery without deterioration

These requirements ~~were first~~

first. No deterioration,

2nd Large condensing Capacity per unit of weight

3rd Rapid charge & discharge

5 To require No attention ~~requires to effect~~

6 - Cheapness

The Cell which is here presented Mr Edison believes comes very close to these requirements —

The cell is composed of 16 ~~the~~ negative Electrodes & 16 Positive Electrodes — placed in an iron cell, The Legend being a ~~[illegible]~~ 20% solution of potassic hydroxide —

~~The weight of the cell complete being [illegible] the total [illegible] [illegible] the Capacity 200 watts [illegible] [illegible]~~

Voltage about 1 volt

Its weight per horse power hour is ~~from~~ about ~~to~~ ~~lb~~ ~~—~~ to ~~to~~ lb per horse power hour it can be made very much lighter

- a cell having a weight of 17 lbs

gives a

~~The~~ Normal discharge rate is 75 Watt amperes — it can be discharged at 200 ~~or more~~ ~~watt~~ ampere without harm to the ~~battery~~ cell —

It holds ~~up~~ "high" percent of its charge for many weeks —

~~The first~~ The cell as it comes from the factory is assembled from the terals and shipped dry — The user adds the liquid & it is ready at once for use after charging

~~A solution from the factory~~

The Negative Electrode Consists of the anhydrous oxide of iron, of the lowest stage of oxidation probably ~~and~~ Fe_2O which is capable of being reduced to the metallic state in an alkaline solution. ~~Electrolytically~~ all other oxides both hydrous and anhydrous are not reducable ~~in solution~~ the iron reduced from iron compounds by hydrogen is not oxidizable —

The Negative Electrode Consists of the hydrated ~~peroxide~~ superoxide of nickel ~~NiO~~ NiO_2

which when suspended to Electrolysis in alkaline solution is reduced to a lower ~~black~~ oxide — probably Ni_2O_3

The Cell when charged will have a as negative element of finely divided metallic iron — the positive element finely divided hydrated ~~Superoxide~~ of Nickel — NiO_2

When discharged the iron is oxidized to the lowest oxide of iron while the hydrated Nickel superoxide is reduced to hydrated peroxide

The alkaline liquid performs no other function than the Electrolytic transfer of oxygen from one element to the other — when charged or discharged and in all intermediate stages the solution is unchanged — hence the quantity may be as small as mechanical consideration will permit ~~and~~ the only ~~change~~ attention the cell requires is that

it shall be kept filled with Water to take place of that lost by evaporating or exchanging

Iron or its oxides & Nickel & its oxides are insoluble in the Electrolyte, ordinary Metallic Nickel & iron are also passive in ~~contact with~~ the Electrolyte when subjected to Electrolytic Oxygen — and no amount of oxidation ever weaken have any apparent effect upon either metal ~~yet and with that which the Iron~~ ~~Cement~~ ~~These~~ Iron is used as the mechanical support for both Elements ~~&~~ is coated with a slight deposit of Nickel to insure good Contacts — The finely divided material of both Elements are mixed with ~~flake~~ specially prepared flake graphite ~~of Carbon~~ the particles of which are larger than the perforations in the pockets of the grids

The proportions of active material ~~[illegible]~~ ~~[illegible]~~ of Cake graphite ~~[illegible]~~ are by weight 1 parts of active material & 3 parts of graphite. The bulk is of Each is nearly Equal — The whole are mixed together in such a way that the faces of the graphite is covered with the active material — the whole being dampened — a special mach ine mould. the material in Cakes with a pressure of about 2 tons per square inch — ~~tons~~ a cup of the same homogeneous the Cake is made in two parts the faces are perforated with minute perforations. the Cake is placed between ~~in~~ the ~~two~~ two parts of the Cups. ~~three~~ there are 24 Cups in Each grid or element, the Cups are assembled into the grid & the whole subjected to a pressure

~~Not~~ There will be
~~an action between the two complete~~
~~Zinc | graphite | steel~~
~~[illegible]~~ Iron of all the metals
is nearest to ~~the~~ Zinc in the Electrolytic
series when in Alkaline solution
its voltage being superior to Cadmium
and as it is just below the water
decomposing point there is no
local action between it & the graphite
This is of great importance as
will readily be seen
as The Nickel is ~~not~~ reduced to the
metallic state of course local
action does not take place
between it & the graphite
The cathode Combination of Iron
Nickel & Alkali is unique
~~[illegible]~~ for the purpose
of storing Energy

of 100 tons, this crimps the pockets together
& to the support in a most perfect manner —
The metal of the Cups is of Crucible Cast steel
is corrugated, ~~for~~ changes & discharges
the active material expands & contracts
but the amount of contraction & expansion
is well within the elastic limit
of the steel walls of the Cups hence it
follows these changes & perfect
Contact is always obtained
~~This important function~~ The importance
of this will readily be seen
When the battery is fully charged
the gassing takes place ~~[illegible]~~ mostly in the
metallic walls of the support of the
pockets, no disturbance of the
active material takes place
no matter how strong the gassing may be
~~The~~ The transfer of oxygen
Ozone to take place ~~[illegible]~~ on the
principle of transference like Cementation
in steel hardening —

The Cell may be rather called a Condenser than a battery so called as it action more nearly resembles an ordinary Condenser —

The resistance of the Electrolyte ~~Cell~~ ~~[illegible]~~ Practical Constant, and is very low about ——— ohm —

The discharge Curve at Constant amperage is shown in figure 1

Fig 2 illustrates a single grid complete

Fig 3 the pocket in two pieces with Cake between —

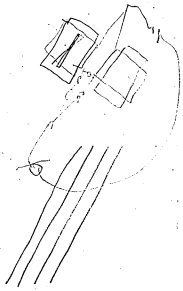
Mr Edison gives me the following interesting results obtained in his experiments with connected with the invention of the battery

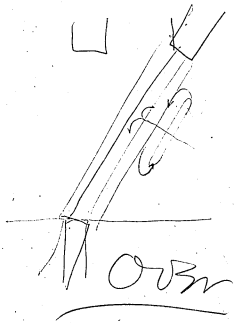
Iron reduced from its salts by hydrogen to the metal is not ~~reducible~~ is not oxidizable by Electrolytic Oxygen in alkaline solution, the reason is unknown

~~The oxides~~ Hydrated oxides of iron are not reducible

Anhydrous ferric oxide or the magnetic oxide are non reducible no compound of iron is reducible except ~~Manganese~~ ~~of~~ The lowest anhydrous oxide a small ~~[illegible]~~ quantity of which is present in scale oxide of iron which needs under certain conditions — and in larger quantities from the reduction to a certain point by hydrogen at certain temperatures & under ~~proper~~ Conditions of the ferric oxide obtained from the ignition of ferrous oxalate in air

~~The oxygen [illegible] of ferrous oxide is [illegible]~~





All nickel oxides made by by heat or in the dry way are practically inert when subject to Electrolysis in alkaline solution

The sesquihydrated sesquioxide Ni_2O_3 made in the usual way does not act as a depolarizer in alkalis.

~~It is also proved~~ The only other compound of nickel which can be used is the monosulphide which when subjected to alternate oxidation & reduction in alkaline solution has the sulphur eliminated & the resultant oxide is capable of being used as the nickelic state, the metal is oxidizable & reducible therefore ~~The oxide [illegible] oxidation of the [illegible] lyser~~ ~~[illegible] lyser~~ ~~[illegible] to possess in alkaline solution~~

~~Formula~~ ~~Nickel sesquioxide Ni_2O_3~~

All Nickel oxides inert in the dry way or [illegible] in alkaline solution, ~~[illegible]~~ ~~Nickel [illegible]~~ Ni_2O_3 does not act as a depolarizer in alkaline solution - when this substance

~~[illegible]~~ by one method of forming the hydrated Sesquioxide Chemically ~~[illegible]~~ a small quantity of Superoxide NiO_2 is formed at the same time, This acts as the depolarizer, but the Current almost wholly changes the Sesquioxide to Superoxide,

is used & put against Zinc in an alkaline solution ~~[illegible]~~ it gives only a slight Effect, ~~gives only [illegible]~~

~~[illegible] Ed [illegible]~~

~~[illegible] that~~

~~if made [illegible] [illegible] it~~

~~[illegible] of The oxide~~

~~was a compound one, probably a mixture of $Ni_2O_3 + NiO$~~

~~[illegible]~~

~~[illegible] to~~

~~subject it to Electrolytic~~

~~oxidation with an [illegible] by [illegible] to NiO_2~~

~~[illegible] oxidation [illegible] or some oxide higher than Ni_2O_3 [illegible] oxide~~

~~[illegible] oxygen or [illegible]~~

~~[illegible]~~

~~[illegible] this~~

~~idea proved correct, and the oxide thus produced Exceeds the depolarizing power~~

Lead peroxide in alkaline solution is not so powerful as the Nickel Superoxide the latter is nearly endothermic

Cobalt acts like Nickel in forming a Superoxide but it is not so powerful, there is a slight solubility in the alkali & the cost of the metal is too great for practical purposes

of lead peroxide under the same conditions. This oxide is nearly + may be an endothermic substance, by special conditions this oxide can be changed ~~[illegible]~~ to the higher oxide ~~[illegible]~~ the composition PbO_2 commercially ~~[illegible]~~

Cadmium Zinc The ~~[illegible]~~ Hydrated Superoxide gives ——— Voltage —

Cadmium ——— Voltage —

Cobalt Hydrated peroxide is like the Nickel peroxide but can be reduced to the higher oxides, partially by changing or changing the Nickel ~~[illegible]~~ the same Voltage — It is slightly soluble in alkaline solution ~~[illegible]~~ to scores + dear to be used

A nickel Element after use
Can be taken from the Cell &
dried in the air, transmit whether
Charged or discharged without
any deterioration or change
noticed when replaced & used
The new Element Can also be
taken from the Cell, dried
in the air for a week or originally discharged
there is no change of it charged
it loses its charge, but no
deterioration takes place when
placed in the Cells it acts
just as before when charged
when users ~~prevent the cell~~
fail to keep the cell full
of water —

150
150
750
750
22500
1800
4

60) 37

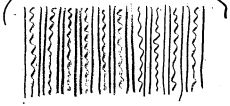
Note = Boil Copper in Cinders
for up a jamming device —

The following oxides of the metals are valuable in electrolytic work in —

Aluminum
Zinc
Tin
Lead
Antimony
Cobalt slightly
Silver
Mercury slightly
~~Bismuth~~
~~Iron~~ Chromium -
The metals unworkable are
Copper, Nickel Iron & Cadmium —

deterioration rapidly increases with the solubility — as there is a constant plating out upon the Exterior of the Electrode, in a powdery form which from time to time becomes detached & drops off + the interior of the active material becomes [illegible]

10 Fe 20 ni —



220. 00a —

144 / 1100" (4 ft
144 / 550 (4 ft

44
25
220
165
275
25 / 1375
25

25 m amp
44
100
100
100

100

4 / 550 - (13 amp
40
150

48
60
384

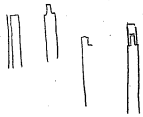
150 -

88
60
5280
3840
912

91 -
10
10
10

25
25
125
25 / 625

44"

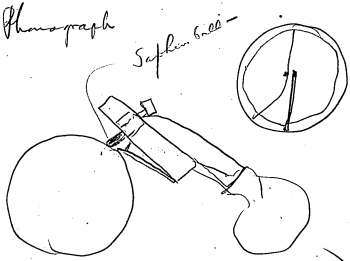


10
1.25 Cents
9/16
20/16

500
150
101
222
1776
1728
384000
2 2/2 tm .005-Thick

Phonograph

Sapphire Ball



ball rests on Cylinder - Depth Dampened
in any manner required -

24 48 / 24 / 192 / 96 / 1152

64 / 4 / 512 / 32 / 2560 / 1536 / 1920 / 1920 / 0

113

453) 17920 - (39
1359
4610
4077
533

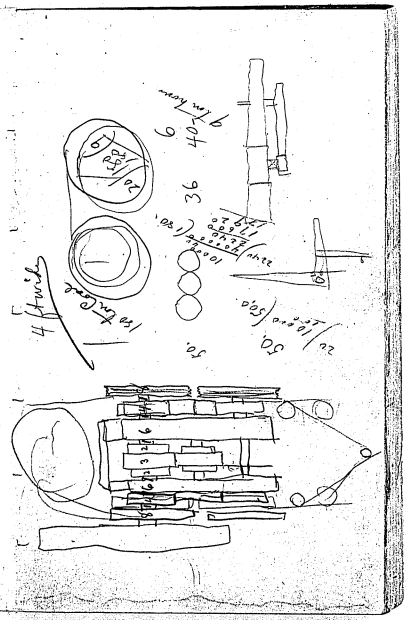
45

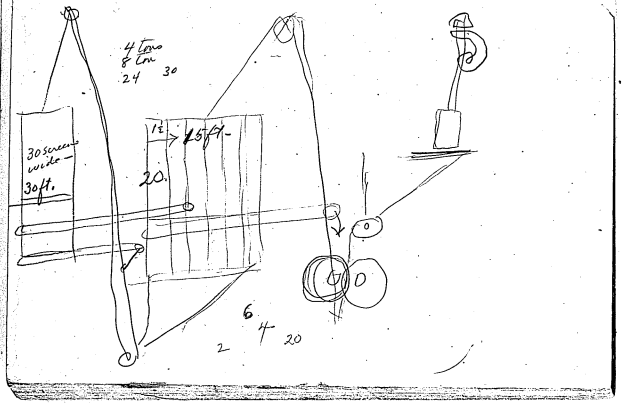
16) 17920 - (1120
16
19
16
32
32

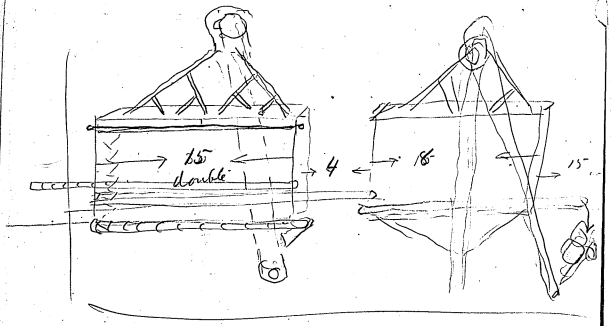
	grammes
Weight steel jar top	364
" of grid alone	35
" Cups on each grid	42
" Briquettes on one grid	132
" 36 Rubber separators	272
" 32 grids complete	6688
" ~~Wax~~ Ceresine	140
" Solution -	[redacted]
"	

19.91 lbs ~~[redacted]~~ 19.9PT

[THIS BOOK WAS USED IN BOTH DIRECTIONS. THE FOLLOWING PAGES WERE FILMED FROM THE BACK END FORWARD.]




4 Tons
& Cu
24
30
30 screen
wide
30ft.
1½
15ft.
20.
6
4
2
20

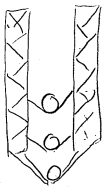

15
double
4
18
15

$600 Day 65 ft. 9.2 ft

20 lbs By Hole

$240.

cut of rock in hole 80 lb.



Drillin	175
Helper	140
Blai	80
Repairs	60
Dipen	25
Hose	20
Oil	14
Waste	3
Drill steel	80
Blacksmithing	55
	602

56
20
14)1120
12
80.
3
12
20
24

25
13
75
25
32
4

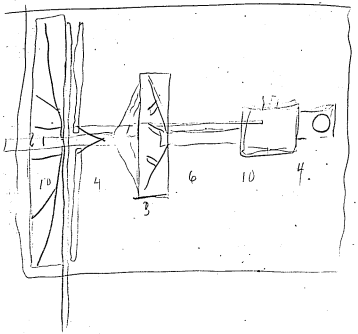
26)330
55

1 2
22
2420
3 2
48
2640

768.
190 3

6,5)600
585
15 00

9,2.


10
4
3
6
10
4.

9
20
14

92
20
184

16
20
320 (2248) 180 (12.8
14) 280 140
40
280
120

~~60 foot cut.~~

Holes 3 ft apart 3 back ~~9 ft~~ 20 deep 180 cft. 12.8 tons

Dynamite 2.40
Drilling 1.84
Loading 20
12.8) 4.490 (35 cents ton
384
1 690
64

4 apart 4 back 20 deep 320 cubft 22.8 tons

~~Dynamite 2.40~~
~~Drilling~~ Cost
22.8) 4490 (197 19.7c ton
228
2212
2052
1580

5 X 5

```
      25
      20
14)  350 (35.7
     280
      700
      700
        0
```

```
35.7 (449.0 (12.5
     357.0
       92.4
      71.50
       20.62
        4.2
```

12.5 cts 1m

6 X 6

```
      36
      20
14)  720 (51
     700
      20
```

```
449 (8.8 cts 1m
408.0
 41.8
```

~~449 (4.4 cts 1m~~

```
~~440~~
     9.0
```

7 X 7

```
      49
      20
14)  980 (70
     980
       0
```

```
449 (6.41 cts 1m
420.0
 29.0
 29.0
  1.0
```

7X8

```
      56
      20
14)  1120 (80
     1120
        0
```

```
449 (5.61 cts -
400.0
 49.0
  1.0
```

97 Dutman ST

in KOH, with glycerin CuO is very soluble +

Ferromanganese true Chem Compounds get some —

See Tim. under Heat 3rd Sup says the affinity for O greater than Cd —

Not only try CuO with acetate Hg for Delaunys battery — but see if CuO_2 can't be made by using Hydrogen peroxide —

---

acid Potassium Vanadate in Contact with Organic matter is ~~[illegible]~~ affected by light — ditto neutral Sodium Vanadate must be low heat of formation like silver tool with Vanad — salts — Can the

Ferrous Oxalate affected by light — (Vide Blue print paper)
Try Gallery —

Hyponitrite of Sodium — or K
Made by acting on Nitrite Na
by Sodium amalgam the solution
after acidulating with acetic
a gives with Silver Nitrate
a yellow pp of Silver Hyponitrite
& then — see 3rd Sep 1408

use for Ethereric Redg Ball

Warm aqueous CyHg dissolves
large quantity of Hg Oxide Red
its an alkaline Sol — deposits
Oxycyanide Hg on needles —

$HgCy_2$ forms double salt with $CHCl_3$
Shake with alcohol —

$HgCy_2$ Key —

$HgCy_2$ forms double salt with formate
of NH_3 ditto for K —

Mercuric Chloride in alcohol
Saturate Carbon dry & neat
as much as possible then
~~pass~~ put over ammonia gas —
also try painting after dry
with strong NH_3 — ~~then~~
Dry diffuse heals —
Try formate & Heat to drive
off H_2 acid & reduce to
metallic state

1½ 3/4 36-

1" 1

75 grms

100 16- 16.00

16

17.40

Soak acetate Hg - Dry & put in Water reduce by H - then dry add more acetate, & Reduce by H + so on —

Try acetate with acetate NH to increase solubility — & then decomp at 350 or 4 deg Fahr & retrial —